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A Multidimensional Analysis of Food Security, Health and Ecological Situation

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Demand for food is progressively becoming challenging for ever increasing population worldwide. Majority of the discussion have focused on growing crop yield which has continuously sustained a vital approach to lessen food insecurity. Nevertheless, in spite of the fact that adequate food is presently produced per capita to nourish the population worldwide but yet a reasonable population suffers from food insecurity especially in under-developed republics. Fulfillment of upcoming food request will be more intricate by harmful variations in climate and other ecological influences, global climate change. This current paper presents true picture of a food systems method to investigate the multifaceted food security arena and highlights numerous substitutes to cop up this situation. These encompass (i) giving a outline for organizing discussions intended at increasing food security and recognizing the variety of interested parties who should be intricate; (ii) participating studies of the complete network of food system doings starting from crop harvesting to consumption of the produced food by those of the food security results i.e. continuous supply chain over yearly, consumption and accessibility rather tan merely focusing on crop production (iii) serving to both evaluate the effects of global ecological conservation on food systems and find responses to the earth system from food system activities; (iv) helping to identify intervention points for enhancing food security and examining interactions and trade-offs between bionetwork facilities and food security, and community welfare results of diverse adaptation paths; and motivation of health-care institution for augmentation of human health services (v) pinpointing where innovative study is desired.

Keywords: Food insecurity, health-care, population, global climate change, crop yield**.** Ecological influences, Intervention points, Health-care institution.

INTRODUCTION

***Importance of food security*:** Global population growth, projected to reach 9.3 billion by 2050, poses significant challenges to food production and the traditional food supply system (Ahmad *et al*., 2023). The development in food consumption surpasses the capability of food production (Byaruhanga and Isgren, 2023). Though, based on conventional crops, the existing food supply system has more austere ecological opposing impacts, comprising greenhouse gas emissions and pesticides. To feed such ever emerging world's population, food security is the utmost dire of the current era which aims at increasing crop yield on sustainable basis through adopting modern agriculture technologies and involvement of poor farmers to ensure food available to common person yearly (Rosas *et al*., 2023).

***Food security in context of global challenge*:** Food uncertainty sustains a persistent problem, mainly in the Global South (Ajefu *et al*., 2023). Even in some areas where the dietary requirements are comparatively fulfilled (particularly in the Global North), there are anxieties regarding the ecological costs linked with food provisioning and nutritional health glitches like cardiac ailments and obesity (Berry, 2019). The United Nations, under Sustainable Development Goal 2, requests for augmented exertions to "finale hunger, attain food security and enhanced nutrition, and encourage sustainable agriculture" (Byerlee and Fanzo, 2019). As revealed in this goal, exertions to finish hunger

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transcend simple obtainability and admittance to foodstuff to incorporate food quality and numerous features of sustainability (Béné *et al*., 2019). It also specify the multifaceted interaction between the communal, cultural, environmental, and financial proportions of food (Braun *et al*., 2023).

***Food security in Global context*:** Neoliberal model for food security is meticulously linked with the renovation project, that wanted to alter old-style farming approaches into developed ones (Rajabi-Kafshgar *et al*., 2023) and agroindustry which commodities and converts agriculture into an business endeavor (Majeed and Mushtaq, 2022). The second are fixed on the implementation of current skills and free market ethics, with the goal of exploiting labor and land output and instituting market-oriented food delivery, correspondingly (Tsakirpaloglou *et al*., 2023). Supporters of the neoliberal method proclaim that free market exchange is essential for guaranteeing food accessibility, mainly for the speedily rising non-farming populations, market admittance for the growers and for decreasing paucity among rural inhabitants in under developed countries (Zhou *et al*., 2023). For the achievement of this purpose, the model shadows a productivist and developmentalist viewpoint, which emphases on increasing food and its accessibility to every one (Sadraei *et al*., 2023). However the method is applauded for its part in nourishing the rising world population by guaranteeing sufficient food delivery, exemplified by the influence of the Green Revolution in Latin America in the start of 20th century but Green Revolution, in spite of improving crop yield, ascertained to be unsustainable, causing ecological harm, noteworthy damage to biodiversity and old-style information, preferring wealthier farmers, and dropping numerous farmers with small holdings into profounder liability". Moreover, even in cases where the model seems fruitful, indication proposes that such achievement depend on deeply on considerable government grants (Ferguson *et al*., 2022), which are frequently missing in numerous underdeveloped nations where the model is being tried. Critics have suggested that the neoliberal food security model lays emphasis on amount and income growth at the expenditure of other serious food security dimensions, like health, parity, ethos, and environment (Pawlak and Kołodziejczak), and therefore, prevents its maintainable development promises (Béné *et al*., 2019). It is ostensible in numerous studies that have connected them with marvelous ecological harm (Brookes and Barfoot, 2018), socio-economic glitches, such as land grasping and downgrading of smallholder agriculture (Glover *et al*., 2019). Therefore, there utmost dire to ponder substitutes which interpret into applied resolutions like alternative food networks (AFNs) and other ordinary communal inventions (Michel-Villarreal *et al*., 2019). There is need to remodel the food systems to imitate wider social relationships and standards such as sustainability, resilience, equity and democracy (Aworh, 2023). In this regards, Now-a-day, term, food sovereignty has attained grip in policy discourse and academic a substitute method with the huge capability to fulfill the world's dietary requirements on sustainable basis (Namany *et al*., 2020).

***Policy of food security in Pakistan*:** In Pakistan, Sustainable Development Policy Institute (SDPI) was established in 1992.

***Aim of SDPI*:** Execute policy instruction, policy focused research and support from a wide multi-disciplinary viewpoint. 2) Encourage the application of programmes, policies, rules and regulations designed for maintainable progress. 3) Reinforce civil humanity and assist civil society-government communication by partnership with numerous administrations and innovative systems. 4) Distribute research outcomes and communal instruction by means of curricula development , media, lectures, seminars, conferences and research papers.

***Food security and its various dimensions*:** The word food security imitates the wish to eradicate starvation and undernourishment (Ashraf and Javed, 2023). It ensures that the entire people throughout the year have bodily and monetary admittance to adequate, harmless and balanced food to fulfill nutritional requirements and food priorities for an energetic and healthy life (Lin *et al*., 2023)." Food security has 3 main parts, i.e. physical accessibility of food, socio-economic admittance to foodstuff and food absorption. For proper absorption of the diet, good body health, cleanliness and clean drinking water are obligatory for nutrition absorption. Right to nutrition is among the fundamental privileges of citizens of Pakistan as well as worldwide, and one necessities to ponder of food security beyond crop yield and wheat storage in Pakistan.

Dimensions of Food Security: Following are the main dimensions of food security;

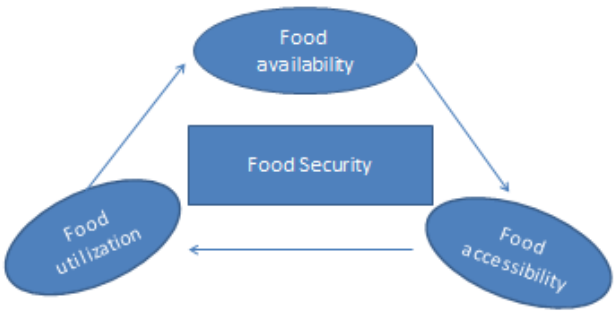

Figure 1. Exploring the multifaceted dimensions of Food Security.

***Food Availability*:** It encompasses the questions that which sort of food is being produced and in how much quantities by available farming. How much food is actually made obtainable for which consumer and in what kind at specific time? How much quantity of the food is being achieved

through locally devised systems like barter system and other practices?

***Access to food*:** This dimension discusses the buying command of poor farmers or societies with respect the food price. Political, communal and monetary term mechanism through food is obtained by the community and Priority of people for specific foods

***Food Utilization*:** It deals with quality and balanced diet to be consumed by people according to their working habits. It covers consumption of specific food on special occasion of societies. It also focus on food poisoning acquaint with in the process of manufacturing, packaging, distribution and food-borne ailments such as salmonella and other diseases.

***Factors influencing food security*:** There are many factors which influence the food security. Among these factors, main are being discussed;

***Climate change*:** Climate is a very vital factor which affects the agriculture outcomes and other infrastructure associated to human life (Shah *et al*., 2023). Any deleterious change in temperature, humidity; rainfall etc. results in remarkable reduction in crop yield leading to food security glitches. Global warming may threaten the ecosystem by resulting in decreased crop produce (Agostoni *et al*., 2023). The more adaption in farmers the less will be threat of food insecurity. The adaptions types in farmers comprised of crop diversification, adoption of new cropping technologies, incomes schemes, Government subsidies etc. In Pakistan, Agriculture is main stream for country's economic growth.

***Population growth*:** The ever growing population is posing serious threats to available food per capita. There are policies to control the increasing population but their implementation and adaption by the families is very less (Atella *et al*., 2019)

***Agriculture practices*:** The farmers are relying on old-style agriculture practices which have resulted in reduced crop yield making the available food insufficient proportional to growing world population.

***Health*:** Define health and its relationship to nutrition and diet.

***Impact of food security on health outcomes (malnutrition, diet-related diseases, etc.)*:** The impacts of food insecurity are broader and can have adverse effects on education, health, and entire life forms. There is association between the upsurge in food insecurity globally and the rise in chronic illnesses (Rancourt *et al*., 2023). Furthermore, research studies revealed that food insecurity have a 2-way connection with cardiac ailments (Virani *et al*., 2020). Food insecurity can result in malnutrition, which can possess severe health penalties, mainly for kids. Malnutrition can results in numerous health glitches, comprising reduced body development and disturbances in metabolites of organisms body. Food insecurity can augment anxiety levels, which can adversely effects the brain health (Siddiqui *et al*.,2020). Food insecurity can also have wider social influences, like augmented wrongdoing rates and abridged economic output (Khan *et al*., 2022).

Food insecurity upsurges the chances of acquaintance to HIV and deteriorates the health of HIV- patients (Gichuna *et al*., 2020). It can also increase the likelihood of diffusion by means of insecure neonatal nourishing practices and falling maternal health (Ali *et al*., 2021; Bryson *et al*., 2021).

***Current state of global food security, including statistics and trends*:**

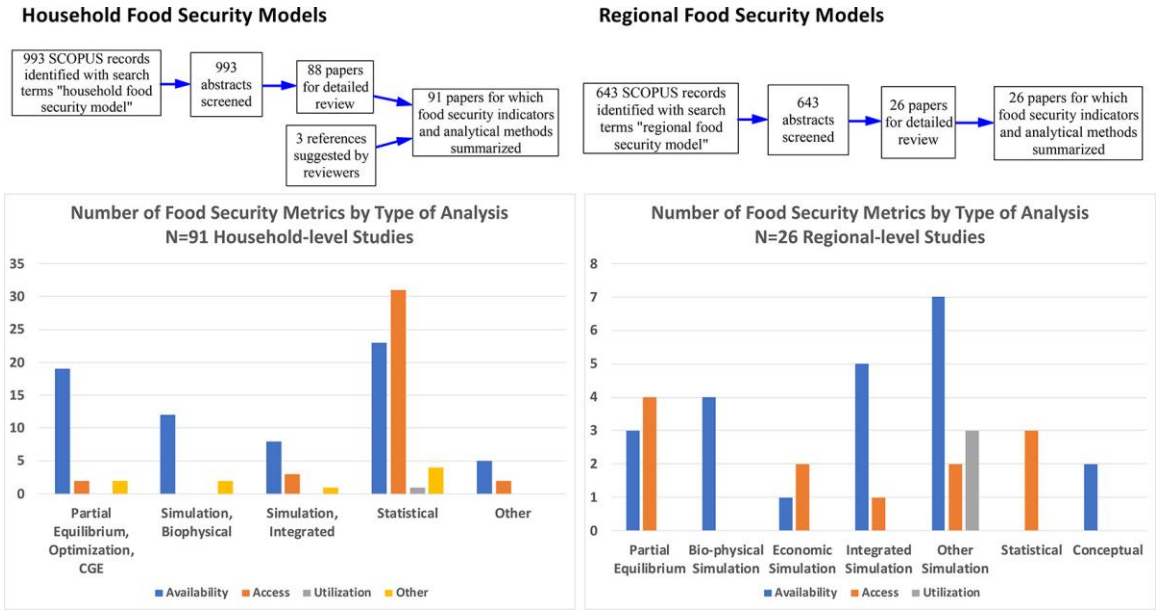

Figure 2. Current food security statistics and trends,
Source: (Nicholson et al., 2023)

Moreover, food insecurity has been associated to drops in human health position, worse immunologic status and reduced antiretroviral adherence (Solis-Cruz *et al*., 2019; Ekwomadu, and Mwanza, 2023), reduced viral destruction (Bleasdale *et al*., 2023; Dear *et al*., 2021), augmented occurrence of severe ailment (Compton and Ku, 2023; Vargas-Vázquez *et al*., 2023), and augmented mortality among HIV patients (Mirón *et al*., 2023).

***Discuss the role of healthcare systems and public policies in addressing health issues related to food security*:** In the food insecurity situation, as the republics struggle to upsurge admittance to wide-ranging health facilities, they are also enforced to rise the part of health related expenses in Gross Domestic Products (GDP) (Chandio *et al*., 2023). In like condition, GDP cannot display robust development in the small term in the expression of growing population and ailments. Moreover, the unavoidable upsurge in health expenses with a getting old population, the danger of food insecurity may place the health system in a further problematic condition in the approaching years (Rosegrant and Cline, 2023). Hence, governments are motivated to regulate their strategies on healthcare systems conferring to the prospects of the communal, in spite of their disadvantages. Numerous socio-demographic influences may circuitously become factors of the healthcare policies and system. For example, during the COVID-19 pandemic, it has been shown that economic affluence, age, educational level and gender, may have effected on vaccination performance in view of vaccine reluctance and cynicism (Yılmaz and Günal., 2023).

***Ecological Situation*:** It comes from the relations of these various climatic factors with each other together with diverse pressures. Stressors are influences that disturb the bionetwork; they can be artificial i.e., Human made such as toxic substances, nutrients and introduced species) or natural like hurricanes, floods etc.

***Components of ecological situation*:** Following are the main components of ecological situation;

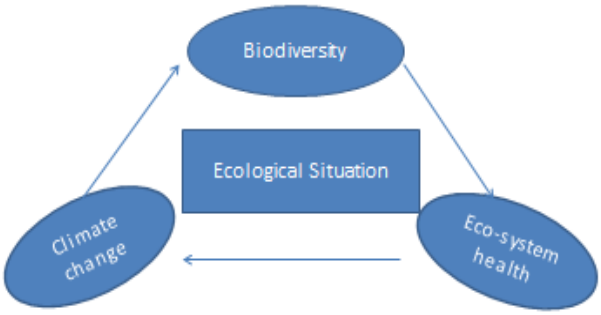

Figure 3. Components of Ecological situation

***Examine how food production and consumption patterns affect the ecological situation*:** Agriculture causes its impact on ecological situation by producing agriculture crops and releasing green-house gases which results in global warming. These results in disruption of normal state of environment leading to climatic changes reduce d crop yield and hazards on species biodiversity. After the production of food, it is consumed by human but the ways of consumption affect the environment such has throwing package materials in water results in aquatic pollution leading to detrimental effects of fish. During processing of food, toxins are released from in the farm of waste water which pollutes the drinking water.

***Importance of sustainable agriculture and conservation efforts*:** By accepting workable practices, farmers will decrease their dependence on fossil fuels, decrease chemical application and protect uncommon capitals. Maintaining the land in healthy and fertile situation will help to fulfill need of the food for ever increasing population.

***Policy and Interventions*:** Food instability is a worldwide problem influencing a great many people and families. While there are changing degrees of hazard in various nations, our review features the significance of considering different aspects like medical services use, gross domestic product, agrarian creation, and meat utilization. The capacity to create and eat horticultural items and meat, or the ability to buy them, diminishes the gamble of food instability. Our review gives a near large scale situational evaluation, featuring the requirement for answers for lessen this gamble on a worldwide scale. Reducing the likelihood of food insecurity may be a crucial step as the healthcare system transitions to proactive treatments that safeguard health before sickness emerges. Finding solutions to this worldwide problem may be aided by further investigation into the rising risk of food insecurity and expanding indicators including food aid, nutritional balance, and food waste. Based on the study's findings, recommendations for nations' short-, medium-, and long-term policies can be made. Short-term suggestions can include alterations to the law governing food safety, tighter inspections, encouragement to gather records pertaining to food safety requirements, launching public awareness programmes, and include food safety in school curriculum.

***Future Directions*:** In recent years, the study of food security has advanced significantly and matured, moving away that extends from the study of single research topics and towards the study of food security, availability, diversification, sustainability, and efficacy. According to study disciplines, environmental science, demography, sociology, and other fields are increasingly coming together in food security research. Food security research should thus be completely conducted in the field due to the junction of its several study fields. The theoretical foundation and standards of this sector will gradually develop as a result of research on ecological, economic, and social levels. The area of study has to be expanded from basic science to technological science. Future studies on food security should focus more on how the economy, environment, and society interact and coordinate

under the guidance of technology advancement and effective policy management. Offer insights into future challenges and opportunities in addressing these multidimensional issues.

***Conclusion*:** Food instability is internationally alarming issue. Reducing the likelihood of food insecurity may be a vital step as the healthcare system safeguard health before sickness arises. Based on the study's findings, recommendations for nations' short-, medium-, and long-term policies can be made. Short-term suggestions can include alterations to the law governing food safety, tighter inspections, encouragement to gather records pertaining to food safety requirements, launching public awareness programmes. Government should provide subside on agricultural inputs and latest agricultural equipment so that poor farmers may able to adopt the latest crop production technologies for increased yield on sustainable basis.

***Author's contribution*:** Humera Amin: Conceptualization, Methodology, Data Collection, Writing – Original Draft, Writing – Review & Editing.Urwah Sheikh: Methodology, Data Collection, Writing – Review & Editing.
Farkhanda Anjum: Methodology, Data Analysis, Writing – Review & Editing.Irfan Ashraf: Supervision, Writing – Review & Editing, Funding Acquisition.Sarfaraz Rizwan: Methodology, Data Analysis, Writing – Review & Editing. Ghulam Murtaza: Conceptualization, Writing – Review & Editing, Project Administration.Nazar Hussain Khan: Data Collection, Writing – Review & Editing, Project Administration.

***Ethical Statement*:** This study adhered to relevant national and international ethical standards and guidelines governing research practices. There were no conflicts of interest that could have influenced the study's outcomes or interpretations. Participants involved in this research were provided with detailed information about the study's objectives, procedures, potential risks, and benefits. Informed consent was obtained from all participants prior to their involvement in the study. Confidentiality of participant information was strictly maintained, and all data collected were anonymized to ensure privacy and protect participants' identities.

***Availability of Data and Material*:** The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request. Materials used or described in this study are available for non-commercial purposes, and requests for materials should be directed to the corresponding author.

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***Code Availability*:** The code used in the analysis is available upon demand from the corresponding author. We encourage reproducibility and transparency in research; hence, interested parties can contact the corresponding author for access to the code used in this study.

***Consent to Participate*:** All participants involved in this study provided informed consent before their participation. They were provided with detailed information about the study's objectives, procedures, potential risks, and benefits. Participants were informed of their right to withdraw from the study at any time without repercussions.

***Consent for Publication*:** All authors listed have consented to the publication of this paperwork. Additionally, any identifiable information or data about participants or individuals involved in this study have been anonymized to ensure confidentiality and protect privacy.

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